

Factoring Quadratic Expressions - COMPLEX TRINOMIAL

$$ax^2 + bx + c$$

The *standard form* of a quadratic is given by $f(x) = ax^2 + bx + c$. If $a \neq 1$, it is called a complex trinomial. If there is no common factor, you must factor using decomposition.

Decomposition	Ex: $3x^2 + 8x + 4$
Find two numbers whose sum is b and whose product is $a \times c$.	Sum = 8 Product = $3 \times 4 = 12$ \therefore Numbers are 6 and 2
Rewrite the trinomial <i>replacing</i> the middle term with the two factors.	$3x^2 + 6x + 2x + 4$
Common factor the first two terms and common factor the last two terms. <i>Note: check that both brackets contain the same terms.</i>	$3x(x + 2) + 2(x + 2)$
Group the two numbers outside of the brackets to form one binomial factor and the common bracket to form the other binomial factor.	$(3x + 2)(x + 2)$

Example: Factor the following:

*** When factoring, ALWAYS check for a common factor first! ***

a) $6x^2 - 7x - 3$ $\therefore -9, 2$
 $\text{sum} = -7$
 $\text{multiply} = -18$
 $6x^2 + 2x - 9x - 3$
 $2x(3x+1) - 3(3x+1)$
 $(3x+1)(2x-3)$

x	x	-1	-1	-1
x ²	x ²	-x	-x	-x
x ²	x ²	-x	-x	-x
x ²	x ²	-x	-x	-x

b) $6x^2 + 7x + 2$ $\therefore 3, 4$
 $\text{sum} = 7$
 $\text{multiply} = 12$
 $6x^2 + 3x + 4x + 2$
 $3x(2x+1) + 2(2x+1)$
 $(2x+1)(3x+2)$

c) $4x^2 - 16x + 15$ $\text{sum} = -16$
 $\text{product} = 60$
 $4x^2 - 6x - 10x + 15$
 $2x(2x-3) - 5(2x-3)$
 $(2x-3)(2x-5)$

d) $6m^2 - 11m - 10$ $-15, 4$
 $a \cdot d = -11$
 $\text{mult} = -60$
 $6m^2 + 4m - 15m - 10$
 $2m(3m+2) - 5(3m+2)$
 $(3m+2)(2m-5)$

e) $10h^2 + 3h - 1$
 $(2h+1)(5h-1)$

f) $15x^2 - 49x + 24$
 $(3x-8)(5x-3)$

~~g) $6m^2 + mn - 2n^2$~~

h) $10x^2 - 17x + 3$
 $(2x-3)(5x-1)$

~~i) $6x^2 + x - 4$~~

~~j) $5r^2s - 7rs + 2s$~~

k) $12 + 22t + 8t^2$
 $2(4t-3)(t+2)$